

CLAIMS

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1. A microstrip antenna comprising:
a first conductive ground plane;
a dielectric substrate disposed on the ground plane;
a patch disposed on the dielectric substrate;
feed means for electrically feeding the patch; and
a dielectric lens for encapsulating at least a portion of the patch to increase radiation gain at low angles.
2. The microstrip antenna of claim 1, further comprising:
a second ground plane formed between the dielectric substrate and the first ground plane for raising the patch and further increasing the radiation gain at the low angles.
3. The microstrip antenna of claim 2, wherein the first and second ground planes are disposed such that a space is created between the first and second ground planes for providing additional elements therein.
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4. The microstrip antenna of claim 2, wherein the dielectric lens covers completely the patch and the dielectric substrate.

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5. The microstrip antenna of claim 2, further comprising:
an air gap disposed between the patch and the dielectric lens.
6. The microstrip antenna of claim 2, wherein the second ground plane includes at
least one slant portion, and a flat portion for disposing thereon the patch, and wherein the
first ground plane is entirely flat.
7. The microstrip antenna of claim 2, wherein the dielectric lens has a dome
configuration.
8. The microstrip antenna of claim 1, wherein the first ground plane is flat and the
dielectric substrate is disposed directly on the first ground plane.
9. The microstrip antenna of claim 1, further comprising:
an additional antenna element disposed through the patch, the dielectric substrate,
the ground plane, and the dielectric lens.
10. The microstrip antenna of claim 9, wherein the additional antenna element is a
monopole.
11. The microstrip antenna of claim 10, further comprising:
a dielectric cap disposed around the monopole.

12. The microstrip antenna of claim 2, further comprising:
a monopole disposed through the patch, the dielectric substrate, the second ground plane and the dielectric lens; and
a dielectric cap surrounding the monopole,
whereby a dual-function antenna is provided.

13. The microstrip antenna of claim 12, further comprising:
an air gap disposed between the patch and the dielectric lens.

14. The microstrip antenna of claim 1, wherein the feed means includes a feed pin disposed through the patch, the dielectric substrate and the ground plane.

15. A method of providing a microstrip antenna, comprising the steps of:
providing a first conductive ground plane;
providing a dielectric substrate on the ground plane;
providing a patch on the dielectric substrate;
providing feed means for feeding the patch; and
providing a dielectric lens encapsulating at least a portion of the patch to increase radiation gain at low angles.

16. The method of claim 15, further comprising the step of:
providing a second conductive ground plane between the dielectric substrate and

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the first ground plane for raising the patch and further increasing the radiation gain at low angles.

17. The method of claim 16, wherein the second ground plane includes at least one slant portion, and a flat portion for disposing thereon the patch, and wherein the first ground plane is entirely flat.

18. The method of claim 15, wherein the first ground plane is entirely flat and the dielectric substrate is disposed directly on the first ground plane.

19. The method of claim 16, further comprising the step of:
providing an additional antenna element disposed through the patch, the dielectric substrate, the second ground plane, and the dielectric lens.

20. The method of claim 19, wherein the additional antenna element is a monopole.

21. The method of claim 19, further comprising the step of:
providing a dielectric cap disposed around the monopole.

22. The method of claim 19, further comprising the step of:
providing an air gap between the patch and the dielectric lens.

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23. The method of claim 15, wherein, in the step of providing the feed means, the feed means includes a feed pin disposed through the patch, the dielectric substrate and the ground plane.

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